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Moving beyond 'Next Wednesday': The interplay of lexical semantics and constructional meaning in an ambiguous metaphoric statement

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Abstract: What factors influence our understanding of metaphoric statements about time? By examining the interpretation of one such statement – namely, *Next Wednesday's meeting has been moved forward by two days* – earlier research has demonstrated that people may draw on spatial perspectives, involving multiple spatially based temporal reference strategies, to interpret metaphoric statements about time (e.g. Boroditsky 2000; Kranjec 2006; McGlone and Harding 1998; Núñez et al. 2006). However, what is still missing is an understanding of the role of linguistic factors in the interpretation of temporal statements such as this one. In this paper, we examine the linguistic properties of this famous temporally ambiguous utterance, considered as an instantiation of a more schematic construction. In Experiment 1, we examine the roles of individual lexical items that are used in the utterance in order to better understand the interplay of lexical semantics and constructional meaning in the context of a metaphoric statement. Following up on prior suggestions in the literature, we ask whether the locus of the ambiguity is centred on the adverb, centred on the verb, or distributed across the utterance. The results suggest that the final interpretation results from an interplay of verb and adverb, suggesting a distributed temporal semantics analogous to the distributed semantics noted for the metaphoric source domain of space (Sinha and Kuteva 1995) and consistent with a constructional view of language (Goldberg 2003). In Experiment 2, we expand the linguistic factors under investigation to include voice and person. The findings suggest that grammatical person, but not grammatical voice, may also influence the interpretation of the *Next Wednesday's meeting* metaphor. Taken together, the results of these two studies illuminate the interplay of lexical and constructional factors in the interpretation of temporal metaphors.

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1 Introduction

Within the field of Cognitive Linguistics, the semantics of spatial language has consistently attracted substantial attention. One reason for this is the role that spatial language plays in the expression of a variety of non-spatial concepts, most prominent among these being time. There are many ways of spatializing time evident both within English and across languages; in this paper, we will focus on the family of conceptualizations which draw upon the metaphor TIME PASSING IS MOTION (Lakoff 1993). For example, time may be conceptualized as a background against which we move, with events as located entities (as in [1–2] below); this conceptualization is known as the Moving Ego metaphor (Clark 1973; Evans 2004). Alternatively, time may be conceptualized as a series of entities that move relative to a stationary observer (as in [3–4] below); (Clark 1973; Evans 2004), referred to as the Moving Time metaphor.

(1) We're approaching Christmas.

(2) We've passed the deadline.

(3) Christmas is approaching.

(4) The deadline has passed.

In addition, temporal events may be ordered in relation to one another, with no reference to an observer, as in (5) (cf. McTaggart 1908):

(5) New Year's Eve follows Christmas.

Accounts of the overlap between spatial and temporal language have in common that, in addition to motivating the sharing of linguistic resources, they make claims about the conceptual structuring of time active at the time of producing or comprehending language about time. How can we gain insight into the metaphors that speakers and listeners are drawing upon when they use spatial language to talk about time? One particularly productive line of research stems from McGlone and Harding's (1998) ingeniously worded temporally ambiguous statement, the interpretation of which depends upon the particular

space-time metaphor being used. In their seminal study, McGlone and Harding (1998) primed participants with a series of context sentences phrased in either the terms of the Moving Ego metaphor (e.g. *we passed the deadline two days ago*) or the Moving Time metaphor (e.g. *the deadline passed two days ago*), before probing to see whether participants would resolve an immediately following ambiguous statement consistently with the metaphor that structured the context sentences. Participants read an ambiguous target statement such as *The meeting originally scheduled for next Wednesday has been moved forward two days* immediately after the context sentences, and were then asked to indicate the day of the week on which the event would occur. McGlone and Harding (1998) found that participants had a strong tendency to interpret the ambiguous statement in a prime-consistent manner, such that those who were primed with Moving Ego metaphors more frequently responded *Friday*, and those who were primed with Moving Time metaphors more frequently responded *Monday*.

Scholars in the cognitive sciences have adapted McGlone and Harding's (1998) *Next Wednesday's meeting* disambiguation paradigm in order to investigate the metaphorically-based connection between space and time. These studies have provided evidence for the psychological reality of three temporal reference strategies, with demonstrations that deictic spatial schemas (Boroditsky 2000; Boroditsky and Ramscar 2002), sequential spatial schemas (Núñez et al. 2006) and extrinsic spatial schemas (Kranjec 2006) can influence how people reason about events in time. However, our conclusions are limited by the reliance on a single experimental statement, McGlone and Harding's (1998) ambiguous *Next Wednesday's meeting* probe.[1] More to the point, while much research has made use of this ambiguous statement, very little research has been conducted to understand the roles of linguistic factors in its interpretation.

Thus, while the "ingenious metaphor disambiguation technique" (Gentner et al. 2002: 556) has been an invaluable paradigm for establishing the psychological reality of metaphoric space-time mappings, we still know very little about how people interpret spatial metaphors for time. To that end, the current paper focuses on the language used to communicate about time, with a particular focus on the ambiguous *Next Wednesday's meeting* probe that has been featured in so much recent work. This famous statement is an instance of a more schematic construction, which we will call the Temporal Motion construction, shown in (1).

1 And, in the studies conducted by Núñez and colleagues (Núñez et al. 2006), its past tense counterpart.

(1) TEMPORAL-EVENT MOTION-VERB *forward/backward* by TEMPORAL-QUANTITY

This construction is used to indicate the rescheduling of an event to another time, separated from the original time slot by the *temporal quantity*. Drawing upon the TIME PASSING IS MOTION (Lakoff 1993) metaphor, the construction describes the rescheduling in terms of linear motion. The construction thus includes lexical items drawn from the source domain of space (the motion verb and the adverb), indicating the change in scheduled time, and lexical items drawn from the target domain of time (the temporal event and the temporal quantity), identifying the moved event and indicating the temporal distance from the originally scheduled time. The direction of change (earlier, later) is arrived at via an interpretive process whereby the comprehender draws upon her knowledge of the spatial meaning of the motion verb and/or the spatial meaning of the adverb (see Section 2 below) in combination with individual qualities that she brings to the comprehension process (Duffy and Feist 2014; Duffy et al. 2014). However, while the combination of spatial and temporal information is evident in the construction, and the psychological evidence suggests that interpretation results from the TIME PASSING IS MOTION metaphor, it is still unclear how the semantics of the lexical items impact the interpretation of the construction. Of particular importance is the influence of those lexical items drawn from the source domain of space due to the ambiguity of the direction of temporal movement. We address this issue in Experiment 1.

In addition to the particular lexical items that fill slots in the Temporal Motion construction, the construction encodes information regarding agency, both via the optional specification of an agent and via the level of perceived agency adopted by the comprehender (Dennis and Markman 2005). Information regarding agency may affect the mental model built by a comprehender while interpreting an utterance (Brunyé et al. 2009; Sato and Bergen 2013). Moving beyond the lexical items to other aspects of the construction, Experiment 2 addresses agency as communicated via the Temporal Motion construction, focusing on grammatical voice and grammatical person.

2 Next Wednesday's meeting: Disambiguating the ambiguity

It has often been assumed that the ambiguity of the *Next Wednesday's meeting* probe stems from the interpretation of the adverb *forward*, for example:

> If the above statement is interpreted using the ego-moving schema, then *forward* is in the direction of motion of the observer, and the meeting should now fall on a *Friday*. In the time-moving interpretation, however, *forward* is in the direction of motion of time, and the meeting should now be on a *Monday*. (Boroditsky 2000: 8)

> The answer to the question about Wednesday's meeting is ambiguous because it depends on how the word *forward* is interpreted in the context of one's mental representation of the timeline. (Kranjec and McDonough 2011: 737)

However, more recently it has been suggested that the verb is a significant factor in the interpretation and, hence, the ambiguity:

> ...simply substitute the word *push* for *move* and the sentence becomes disambiguated:
> Next Wednesday's meeting has been *pushed* forward by two days
> While *moved* can refer to movement in several different directions depending on one's perspective, *pushed* nearly always implies movement in a forward direction. When we push something, we use the muscles of our arms and trunk to propel the object away from us in a forward direction.[2] (Restak 2011: 44, our italics)

In other words, the ambiguity of the original statement may be rooted in the use of a directionally neutral verb, *move*.

The above proposals share the assumption that lexical items each contribute independently to the interpretation of the utterance as a whole; hence, the inferred direction of motion may arise from the interpretation of *forward* (Boroditsky 2000; Kranjec and McDonough 2011), or the ambiguity may stem from the directional neutrality of the verb *move* (Restak 2011). We put forth here an alternative explanation, inspired by constructionist views of language which argue that utterances represent combinations not only of lexical items, but also of schematic constructions (Goldberg 2003; Langacker 1987), with the result that the interpretation – and, thus, the ambiguity – stems from the combination of the verb and the adverb rather than from the individual contribution of either. In this case, the Temporal Motion construction would encode a distributed semantics of time akin to that found in the source domain of space (Sinha and Kuteva 1995).

Consistent with this view are the findings of Elvevåg et al. (2011) who, in their examination of interpretations of temporally ambiguous utterances in Dutch, used three different verb-satellite combinations: *voorwarts verplaatst* (*moved forward*), *teruggeschoven* (*pushed back*), and *vervroegd* (*advanced*). Although the sentences involving *voorwarts verplaatst* (*moved forward*) did

2 It is interesting to note that Restak's (2011) interpretation presumes a lack of ambiguity stemming from the adverb *forward*.

elicit both Moving Ego and Moving Time responses as expected, there was no variation in responses to utterances using *teruggeschoven* (*pushed back*) and *vervroegd* (*advanced*), suggesting that these sentences were "not as ambiguous as… assumed" (2011: 17) and, further, that the verb and adverb in the initial question may conjointly give rise to the ambiguity. In contrast to explanations of the ambiguity that are rooted in the interpretation of a single lexical item, this constructionist account suggests a view of language in which interpretation arises not from the independent contributions of individual lexical items, but rather from the interplay of co-occurring lexical items and the context of the utterance (MacDonald and Seidenberg 2006; Trueswell and Tanenhaus 1994).

To discriminate between the lexical view of interpretation and the constructionist view, Experiment 1 investigates the source of the ambiguity in the *Next Wednesday's meeting* probe. Specifically, we ask whether the ambiguity stems independently from the verb (*move*), independently from the adverb (*forward*), or indeed from a combination of both. If the ambiguity stems from the verb, then replacing *move* with a different motion verb should alter the inferred direction of motion of the meeting. Similarly, if the ambiguity stems from the adverb, then replacing *forward* should alter the inferred direction of motion. However, a finding that these factors interact such that the effect of replacing the adverb varies depending on the verb would suggest a more significant departure from prior proposals, in line with a constructionist analysis of McGlone and Harding's (1998) ambiguous probe.

2.1 Experiment 1

2.1.1 Participants

360 administrators[3] from two universities in Newcastle-upon-Tyne participated in this experiment, with an age range of 18–67 years and a mean age of 46 years. All participants were native speakers of English from the UK.

3 Previous research has shown that lifestyle factors influence people's interpretations of the *Next Wednesday's meeting* probe (Duffy and Feist 2014), suggesting that studies sampling only a student population may not provide a complete picture of the factors influencing language interpretation. In order to better understand the ways in which temporal statements are comprehended, we have expanded our participant pool in the current studies to sample from different segments of the population: persons with full-time non-academic employment in Experiment 1, and students in Experiment 2.

2.1.2 Materials and procedure

Participants were approached on the university campuses in offices, coffee shops and the university libraries. All participants completed the questionnaire using a pen while sitting down. The questionnaire consisted of one experimental question: the *Next Wednesday's meeting* disambiguation task, in addition to demographic questions requesting the participant's age, gender, nationality, native language and occupation. Participants were informed that the experimenter was investigating attitudes towards time management in universities.

The following instructions appeared at the top of the page:

> Please read the following question and provide your answer below. Do not spend too much time thinking about it and do not change your answer: I am interested in your initial reaction.

18 variants of the *Next Wednesday's meeting* disambiguation task were created by combining one of nine verbs (*move*, *bring*, *pull*, *rush*, *draw*, *push*, *shift*, *carry* or *take*) and one of two adverbs (*forward* or *backward*):[4]

> *Next Wednesday's meeting has been [verb]* ***adverb*** *two days.*
> *What day has the meeting been re-scheduled to?*

Each participant responded to only one variant of the question, for a total of 20 responses to each question variant.

2.1.3 Predictions

The first element of Experiment 1 is to investigate how people interpret the Temporal Motion construction when the adverb is varied. We used two adverbs indicating movement through linear time in our materials: *forward*, which has been featured in the *Next Wednesday's meeting* probe, and its antonym, *backward*.

In order to understand whether these adverbs encode inherent directional biases, we searched the Corpus of Global Web-Based English (GloWbE; Davies 2013) for co-occurrences of *meeting* and each of the target adverbs, extracting 200 hits for each adverb from the results for Great Britain. 187 of the results for

4 While some of these combinations may appear more comprehensible than others, we did not observe a noticeable difference in how quickly participants responded, nor did participants particularly express any difficulties with the [verb] *backward* conditions – a trend that is in line with other research suggesting that well-formed novel metaphors are understood as readily as familiar ones (e.g. Giora 1997; Glucksberg 2001; McElree and Nordlie 1999).

forward were judged to be temporal, with 185 of these indicating a movement later in time.[5] In contrast, only two of the results for *backward* were judged to be temporal; both indicated a movement earlier in time.[6] If the adverb plays an independent role in the interpretation of the *Next Wednesday's meeting* probe (cf. Boroditsky 2000; Kranjec and McDonough 2011), then responses to the *[verb]* ***forward*** constructions should evidence significantly more *Friday* responses than should their *[verb]* ***backward*** counterparts.

The second element of Experiment 1 is to investigate how people interpret the Temporal Motion construction when the verb is varied. We created versions of the *Next Wednesday's meeting* probe with the following nine verbs: *move*, *bring*, *pull*, *rush*, *draw*, *push*, *shift*, *carry* and *take*.[7]

In order to understand whether these verbs encode inherent directional biases, we analyzed their semantics based on information from two online lexical databases – FrameNet[8] and WordNet[9] as well as Levin's (1993) analysis of English verbs.

Two of the selected verbs (*move* and *shift*) encode movement of an entity brought about by an external agent, with no requirement that the agent move and no specification of the direction of motion. As a result, these two verbs are hypothesized to be directionally neutral.

The verb *rush* is the only verb in the set that has a temporal component (*hurriedly)*, suggesting motion toward an earlier time. Due to this temporal semantic component, we hypothesized that this verb would be more consistent with a *Monday* response and, hence, with the Moving Time perspective.

The remaining six verbs encode motion relative to an agent who brings about the change of location of some entity. Thus, any directional biases in the interpretation of subjectless uses of these verbs will result from expectations based on the most common types of agents appearing with each verb. Recent research suggests that comprehenders adopt an internal perspective (i.e. comprehender as agent)

5 179 of the extracted uses involved the verb *look*. Of the 8 uses that didn't involve *look*, 3 involved *take* (all of which encoded time later), 2 involved *go* (and time later), 2 involved *bring* (and time earlier), and 1 referred to *the way forward*.

6 A subsequent search for co-occurrences of *meeting* and *back* resulted in 137 hits, 38 of which were judged to be temporal. Of these, 34 indicated a time earlier than the present.

7 The verbs chosen for this study represent the variety of motion verbs that could be used to communicate scheduling changes. We verified that these verbs are, in principle, compatible with the movement of events in time through a search of the Global Web-Based English (GloWbE; Davies 2013) corpus, which established co-occurrence of each of the nine verbs with the noun *meeting*.

8 Available at: https://framenet.icsi.berkeley.edu [accessed July 2014].

9 Princeton University (2010). Available at: http://wordnet.princeton.edu [accessed July 2014].

when presented with sentences containing second person subjects such as 'you', and an external perspective (i.e. other as agent) when presented with sentences containing third person subjects such as 'he' (the evidence regarding sentences with first person subjects such as 'I' is mixed) (Brunyé et al. 2009; Sato and Bergen 2013). In a similar fashion, comprehenders may assume an internal perspective for verbs that more typically take second-person agents,[10] and an external perspective for verbs that more typically take a third-person agent. In order to infer a likely directional bias for verbs that encode motion relative to an agent, we extracted 200 transitive uses of each verb from the BYU-British National Corpus (Davies 2004–) and coded each for the person (first, second, or third) of the agent.

Two of the verbs (*pull* and *draw*) encode an agent bringing about a change of location of some entity, typically toward the location of the agent. For both verbs, the most typical agent is third person (accounting for 53.5% of the analyzed uses of *pull* and 49.5% of the analyzed uses of *draw*), suggesting a weak bias toward the other as agent and, in keeping with the Moving Time and Moving Ego metaphors instantiated on the two-dimensional time line, a weak directional bias toward another (i.e. away from the observer). We thus hypothesized that these two verbs would be slightly more consistent with the Moving Ego perspective and, hence, with a *Friday* response.

The verb *push* encodes an agent bringing about a change of location of some entity, typically away from the location of the agent. As with *pull* and *draw*, the most typical agent was again found to be the third person (accounting for 63% of the analyzed uses). In keeping with the Moving Time and Moving Ego metaphors instantiated on the two-dimensional time line, motion away from the other suggests motion toward the observer; therefore, we hypothesized that this verb would be more consistent with the Moving Time perspective and, hence, with a *Monday* response.

The final three verbs (*carry*, *bring*, and *take*) encode an agent bringing about a change of location of some entity along with and in the direction of motion of the agent. The directional bias is thus predicted to be in the direction of motion of the most typical agent. For all three verbs, the most typical agent is third person (accounting for 77% of the analyzed uses of *carry*, 58% of the analyzed uses of *bring*, and 54% of the analyzed uses of *take*), suggesting compatibility with the Moving Time perspective. However, *bring* and *take* also encode a deictic element, functioning as the "causative counterparts of *come*

10 We shift our focus from the syntactic role of subject to the semantic role of agent in order to assess the likely cause of the movement assumed based on prior experiences with the verbs.

and *go*" (Levin 1993), with *bring* suggesting motion toward an observer, and *take* suggesting motion away from an observer. This deictic component thus strengthens the compatibility with the Moving Time perspective for *bring*, but weakens (and, potentially, reverses) this compatibility for *take*.

The final element of Experiment 1 is to ask whether these lexical items independently contribute to interpretation, as suggested by a lexical view of language comprehension, or whether they instead conjointly and interactively determine interpretation, in line with a constructionist view. To this end, we ask whether the influence of the adverb varies across the set of verbs, as would be expected if interpretation arises from a context-bound understanding of the complex of lexical items in which each influences the likely interpretation of the others rather than from the additive semantic contributions of each.

2.1.4 Results

In line with suggestions regarding the importance of the adverb in the interpretation of the *Next Wednesday's meeting* probe, we observed a shift in response in the *[verb]* ***backward*** versions relative to the *[verb]* ***forward*** versions (Figure 1). This shift was confirmed through logistic regression, which revealed a significant effect of the adverb, X^2 (df $= 1$) $= 30.00$, $p < 0.0001$. However, contrary to expectations arising from the corpus data, we observed a greater incidence of *Monday* responses for the *[verb]* ***forward*** versions of the construction, raising questions about the strength of the adverb's independent contribution to interpretation.

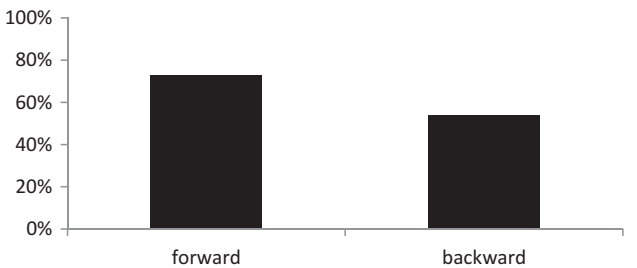

Figure 1: Rate of *Monday* responses for the *[verb] forward* and *[verb] backward* sentences, averaged across verbs.

In a similar vein, we also observed an effect of the verb, whereby the balance of *Monday* vs. *Friday* responses varied across the set of verbs that we tested (Figure 2). Notably, the verb used in McGlone and Harding's (1998) *Next Wednesday's meeting*

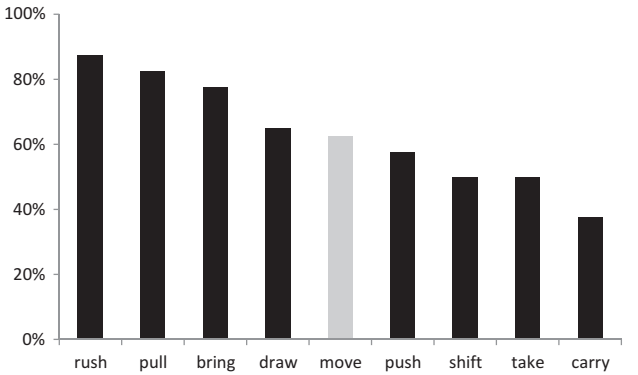

Figure 2: Rate of *Monday* responses to sentences employing different verbs, averaged across adverbs. The results for *move* are shown in grey.

probe, *move*, elicited a *Monday* response rate of 63%, underscoring its contribution to the ambiguity of the original statement. The effect of the verb was confirmed through logistic regression, X^2 (df = 8) = 56.50, $p < 0.0001$.

Looking more closely at the results for the individual verbs, we see that the interpretations differed from those that were expected based on the uses of the verbs in the corpus. One potential explanation is that our study examined interpretations of temporal metaphors, whereas the corpus analysis was not limited to temporal uses of the verbs, suggesting that the Temporal Motion construction may interact with the semantics of the lexical items to yield a likely inferred direction of movement. While we leave a fuller examination of this question to future research, we will here lay the groundwork by asking whether the verb and adverb combine to give rise to an integrated interpretation rather than individually determining the inferred direction of motion.

Consistent with the constructionist account, we observed an interaction between the verb and the adverb, whereby the effect of changing from the *forward* version to the *backward* version varied depending on the verb used (Figure 3). This co-dependence of the verb and the adverb undermines accounts that hinge upon the interpretation of independent lexical items. The interaction of the verb and the adverb was confirmed through logistic regression, X^2 (df = 8) = 37.86, $p < 0.0001$.

Looking more closely at the data, we observed that those verbs that elicited a greater than 50% proportion of *Monday* responses overall also elicited more *Monday* responses in the *forward* condition than in the *backward* condition,[11] suggesting that the verbs may presuppose different perspectives that become

11 We thank an anonymous reviewer for pointing out this detail in our data.

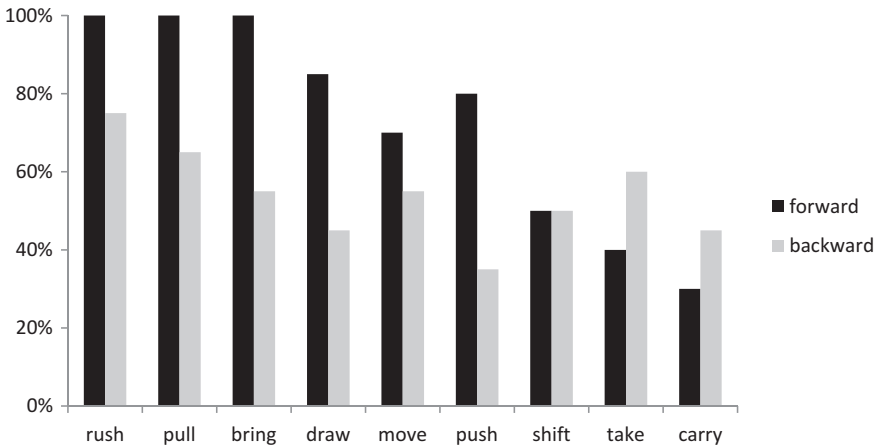

Figure 3: Rate of *Monday* responses to the 18 *verb-adverb* combinations.

amplified when modified by an adverb, further strengthening the interactionist account of interpretation. To wit, two of the verbs, *bring* and *take*, include a deictic component to their meanings (Levin 1993), thus inviting the comprehender to assume an active role in the described situation. Concretely, as the "causative counterpart of *come*" (Levin 1993), *bring* suggests movement toward the comprehender, whereas *take*, the "causative counterpart of *go*", suggests movement away from the comprehender. These tendencies were amplified with *forward* and attenuated with *backward*: we observed a higher incidence of *Monday* responses when *bring* was combined with *forward* than with *backward*, while the opposite pattern obtained for *take*.

2.1.5 Discussion

It has been assumed by a number of scholars that the ambiguity of the *Next Wednesday's meeting* probe stems from the interpretation of the adverb *forward* (Boroditsky 2000; Kranjec and McDonough 2011), while others have suggested that the source of the ambiguity may be the verb (Restak 2011). In contrast to these lexically based explanations, we put forward a third account, based in recent work on constructions (Goldberg 1995, 2003, 2006; Jackendoff 2002; Langacker 1987), whereby the interpretation stems from an interplay of the lexical items as part of the Temporal Motion construction. Taken together, our findings suggest that the ambiguity of the original *Next Wednesday's meeting* probe likely stems from multiple interacting sources, lending support to a

constructionist account of interpretation. Concretely, while our findings confirm the roles of both the adverb and the verb in interpretation, neither the effect of the adverb nor the effect of the verb aligns with uses of these lexical items across a wider range of contexts, suggesting that their interpretations vary as a function of the construction within which they are found.

The observed interaction between the verb and the adverb likewise suggests that lexical items do not influence interpretations in a modular fashion. In much the same way as locative information is not solely encoded in the locative particle (Sinha and Kuteva 1995), our findings suggest that metaphoric motion information is not encoded in any single lexical item but rather depends on the co-occurrence of the particular lexical items and on the construction. In Experiment 2, we push this finding further, exploring an additional linguistic feature of the original *Next Wednesday's meeting* probe: inferred agency.

2.2 Experiment 2

The Moving Ego and Moving Time metaphors each have an "implied agency", with the moving self taking on the role of the implied agent in the Moving Ego metaphor, and the "other" taking the role of the implied agent in the Moving Time metaphor (Dennis and Markman 2005). Building on this observation, Dennis and Markman (2005) sought to investigate whether thinking about agency or passivity would influence temporal reasoning. In their study, participants were given a series of sentences to unscramble, including either the first person subject pronoun, 'I' (e.g. *Mary I bridge under kissed the* "I kissed Mary under the bridge") or the first person object pronoun, 'me' (e.g. *Mary me kissed the bridge under* "Mary kissed me under the bridge") before responding to the *Next Wednesday's meeting* probe (John Dennis, p.c. July 2013). They hypothesized that for participants who unscrambled the 'I' sentences, the sentence structure would prime representations of agency and hence would encourage use of the Moving Ego perspective (responding *Friday*), whereas for participants who unscrambled the 'me' sentences, the sentence structure would prime representations of passivity and hence would encourage use of the Moving Time perspective (responding *Monday*). As predicted, participants tended to respond in a prime-consistent manner to the *Next Wednesday's meeting* disambiguation task, suggesting that different ways of thinking about – and communicating – agency can yield different construals of time.

More recently, Richmond et al. (2012) tested for a connection between level of perceived agency and the temporal perspective adopted in the *Next Wednesday's meeting* task. Using the Behaviour Identification Form (Vallacher and Wegner 1989)

to measure individual differences in perceived agency, they found that participants who adopted the Moving Ego perspective (responding *Friday*) evidenced significantly higher agency scores than participants who adopted the Moving Time perspective (responding *Monday*). Taken together, the findings from these experiments suggest that perceived agency does play a role in the temporal perspective adopted, but the studies do not allow us to pinpoint the source of the effect.

There are at least two ways to linguistically indicate agency: through grammatical voice (with active voice implying higher agency than passive voice, as in Dennis and Markman's [2005] study), and through the explicit naming of an agent via pronoun choice. Recent research has suggested that comprehenders use personal pronouns as a cue to their own agentive involvement in a situation, as demonstrated by the perspective adopted during simulation: an internal perspective (i.e. comprehender as agent) is adopted when participants are presented with sentences containing second person subjects ('you'), and an external perspective (i.e. other as agent) is adopted when participants are presented with sentences containing third person subjects ('he') (the evidence regarding sentences with first person subjects is mixed) (Brunyé et al. 2009; Sato and Bergen 2013). In McGlone and Harding's (1998) original probe, the absence of an explicit agent creates an ambiguity regarding the extent to which the comprehender may assume the role of implied agent. This ambiguity might be resolved in the Temporal Motion construction through explicit linguistic cues, in which case these cues to agency should give rise to interpretations consistent with the associated temporal perspective: Moving Ego for the self as agent, and Moving Time for the other as agent. Experiment 2 thus looks systematically at linguistic cues to agency to better understand which, if any, influence the temporal perspective adopted in disambiguating the *Next Wednesday's meeting* probe.

The first cue that we considered is grammatical voice (Dennis and Markman 2005), instantiated through the use of either the active construction or the passive construction. In order to examine grammatical voice as a cue to agency, we presented participants with both active and passive versions of the *Next Wednesday's meeting* probe. Based on Dennis and Markman's (2005) study, we predict that the active construction would encourage use of the Moving Ego perspective (as evidenced by a *Friday* response), while the passive construction would encourage use of the Moving Time perspective (as evidenced by a *Monday* response).

In order to examine the second cue, the personal pronoun naming the agent, we explicitly included a first person, a second person, or a third person agent, for a total of six experimental conditions (first person active, first person

passive, second person active, second person passive, third person active, and third person passive). We expect the second person to contrast with the third person, as the participant as addressee is positioned as in control of moving the meeting in a second person phrasing (e.g. *You have moved forward next Wednesday's meeting by two days* [active voice] or *Next Wednesday's meeting has been moved forward two days by you* [passive voice]), while another person is positioned as in control of moving the meeting in a third person phrasing (e.g. *She has moved forward next Wednesday's meeting by two days* [active voice] or *Next Wednesday's meeting has been moved forward two days by her* [passive voice]) (cf. Brunyé et al. 2009; Sato and Bergen 2013). Unlike the second and third person phrasings, the first person phrasing admits of an ambiguity as to whether the person responsible for moving the meeting refers to the respondent or to a person addressing the respondent (e.g. *I have moved forward next Wednesday's meeting by two days* [active voice] or *Next Wednesday's meeting has been moved forward two days by me* [passive voice]) (cf. Brunyé et al. 2009). Consistent with the correlations between agency and temporal representation observed in earlier research (Dennis and Markman 2005; Richmond et al. 2012), we predict that higher perceived agency will result in adoption of a Moving Ego perspective and, hence, a higher rate of *Friday* responses. Thus, we expect a higher rate of *Friday* responses for the second person versions than for the third person versions, with an intermediate rate of *Friday* responses for the ambiguous first person versions.

2.2.1 Participants

108 full-time undergraduate students from Northumbria University participated in this experiment (18 participants in each of the six conditions), with an age range of 19 to 26 years and a mean age of 21 years. 45 participants were male and 63 were female. All participants were native speakers of English from the UK.

2.2.2 Materials and procedure

A two-part questionnaire was distributed during a class session.[12] Participants were randomly assigned to the active voice condition or the passive voice condition and the first person versions were distributed to a separate class

12 72 of the participants were in a second year English literature class; the remaining 36 were in a second year history class.

from the one in which the second person and third person versions were distributed. Following informed consent, all participants completed the questionnaire using a pen while sitting down.

Part 1 of the questionnaire gathered demographic information: age, gender, native language and nationality. For Part 2 of the questionnaire, participants were instructed to imagine one of the following hypothetical scenarios:

First person active condition:

I have just emailed a colleague informing her that I have moved forward next Wednesday's meeting two days. For confirmation, what day has the meeting been rescheduled to?

First person passive condition:

I have just emailed a colleague informing her that next Wednesday's meeting has been moved forward two days by me. For confirmation, what day has the meeting been rescheduled to?

Second person active condition:

You have just emailed a colleague informing her that you have moved forward next Wednesday's meeting two days. For confirmation, what day has the meeting been rescheduled to?

Second person passive condition:

You have just emailed a colleague informing her that next Wednesday's meeting has been moved forward two days by you. For confirmation, what day has the meeting been rescheduled to?

Third person active condition:

You have just received an email from a colleague informing you that she has moved forward next Wednesday's meeting two days. For confirmation, what day has the meeting been rescheduled to?

Third person passive condition:

You have just received an email from a colleague informing you that next Wednesday's meeting has been moved forward two days by her. For confirmation, what day has the meeting been rescheduled to?

2.2.3 Results

We observed that an explicitly named agent influenced the temporal perspective that participants adopted (Figure 4). Concretely, 75% of participants in the third person conditions responded *Monday*, as compared to 44.4% of participants in the second person conditions and 55.6% of participants in the first person conditions. A logistic regression confirmed that these differences were significant, X^2 (df = 2) = 7.29, $p < 0.03$. Follow-up tests revealed that responses in

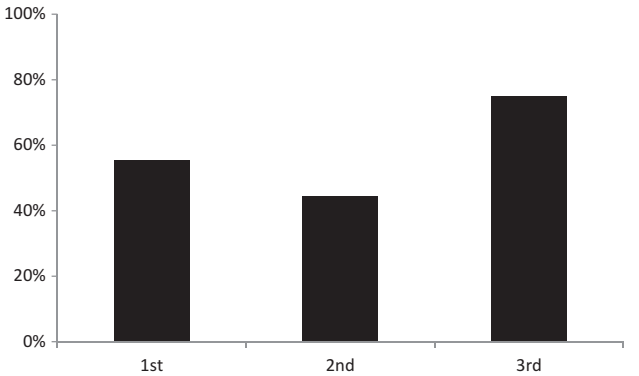

Figure 4: Rate of *Monday* responses across personal pronoun conditions.

the second person condition differed significantly from responses in the third person condition (X^2 (df = 1) = 6.99, $p < 0.01$), but that responses in the first person condition did not differ from responses in either of the other two conditions (Figure 4).

In contrast to the effect of personal pronoun, we observed no effect of grammatical voice, nor did we observe an interaction between personal pronoun and voice (both *p*s > 0.3), suggesting that voice may not have been a reliable cue to agency in this context.

2.2.4 Discussion

Inspired by prior research suggesting that level of perceived agency may influence the temporal perspective a participant adopts when disambiguating the *Next Wednesday's meeting* probe, Experiment 2 sought evidence that the underspecification of grammatical indications of agency in McGlone and Harding's (1998) question may have contributed to the ambiguity. Extending on the findings reported by Dennis and Markman (2005) and Richmond et al. (2012), which demonstrate that different ways of thinking about agency can yield different construals of time, the aim of Experiment 2 was to directly examine the relationship between grammatical agency and representations of time by altering the grammatical voice (active or passive) and the implied agency resulting from the use of a personal pronoun to name the agent in the *Next Wednesday's meeting* probe. The findings revealed a significant effect of pronoun, echoing recent findings regarding comprehenders' perceptual simulations following presentation of a short discourse. Consistent with

the assumption that there is an implied agency within the Moving Ego and Moving Time metaphors, the findings show that a linguistically encoded agent may influence participants' interpretations of the *Next Wednesday's meeting* probe.

3 General discussion

3.1 Overview

While investigations of the disambiguation of McGlone and Harding's (1998) famous temporally ambiguous *Next Wednesday's meeting* probe have proven invaluable for establishing the psychological reality of metaphoric space-time mappings (e.g. Boroditsky 2000; Kranjec 2006; Núñez et al. 2006), our understanding of the contributing linguistic factors was hitherto quite limited. In order to better understand the nature of the ambiguity, we turned our attention to the probe's linguistic properties.

To begin, we noted that McGlone and Harding's (1998) probe is an instance of a more schematic construction, the Temporal Motion construction. Drawing upon the Time Passing is Motion metaphor, this construction employs lexical items from the source domain of space to indicate a change in the scheduling of an event, and lexical items from the target domain of time to name the event and indicate the temporal distance between the originally scheduled time and the new one.

In Experiment 1, we tested a constructionist account of McGlone and Harding's (1998) ambiguous probe, contrasting it with a lexical account whereby the direction of temporal motion is determined by the interpretation of a single lexical item. The results showed that the responses varied with changes to the motion verb and changes to the adverb. More to the point, we observed an interaction between the verb and the adverb, whereby the effect of changing from the *forward* version to the *backward* version varied depending on the verb used, suggesting that lexical items do not influence interpretations in a modular fashion. These findings are consistent with hypotheses that language comprehension may generally be driven by the interweaving of semantic information from across the utterance, rather than by stringing together independent contributions from the various lexical items used Goldberg 2003; MacDonald and Seidenberg 2006; Trueswell and Tanenhaus 1994). Like the evidence regarding a distributed semantics of space (Sinha and Kuteva 1995), the findings of Experiment 1 add to the body of evidence for theories of language comprehension based on the concurrent satisfaction of multiple constraints.

Pushing the constructionist account farther, Experiment 2 builds on earlier findings indicating that level of perceived agency may influence the temporal perspective a participant adopts (Dennis and Markman 2005; Richmond et al. 2012). We investigated the relationship between constructional cues to agency and representations of time by altering the grammatical voice (active or passive) and the personal pronoun naming the agent (first, second or third) in the *Next Wednesday's meeting* probe. The results showed that an explicitly named agent influenced the temporal perspective that participants adopted. Specifically, when the wording implied that the participants had moved forward the meeting (the second person condition), they were more likely to adopt the Moving Ego perspective (responding *Friday*), whereas when participants were informed that a colleague had moved forward the meeting (the third person condition), they were more likely to adopt the Moving Time perspective (responding *Monday*). Much as personal pronouns influence the perspective adopted during simulation in response to a short discourse (Brunyé et al. 2009; Sato and Bergen 2013), these findings show that an inferred agent may play a role in influencing participants' interpretations of the Temporal Motion construction.

3.2 Implications

Across two experiments, we observed that changes in the language of the *Next Wednesday's meeting* probe resulted in changes in the temporal perspective adopted. More importantly, we found that the effect of changes to one linguistic factor depended on other linguistic elements, in line with a constructionist account of metaphor interpretation. At the same time, the findings give rise to new questions regarding the ambiguity of McGlone and Harding's (1998) famous task. First, we note that the proportion of *Monday* responses was quite high in comparison to the proportion of *Friday* responses in Experiment 1, to the extent that three *[verb]* ***forward*** versions of the construction were unanimously considered to denote rescheduling the meeting to *Monday*. One possible reason is that a frequently used lexical item already exists in English for conveying the deferral of an event – *postpone* – but there is no parallel lexical item in British English that unambiguously conveys that an event has been moved earlier in time.[13] The most likely

13 This is not, however, the case for all dialects of English. An Indian English neologism of very general currency that has been coined as an antonym of postpone is *prepone* (Oxford English Dictionary 2007). The coinage of this verb exploits the morphology of English in an entirely regular way, as exemplified by the formation of the related, contrasting words: *predate* and *postdate*. We thus might expect different patterns in the responses should a different dialect be tested.

candidate antonym for *postpone* in British English would be the phrase *bring forward* (Widdowson 2003; cf. Cambridge Dictionaries Online 2013), one of the instantiations of the Temporal Motion construction employed in Experiment 1. Thus, it may be that the *[verb]* ***forward*** versions of the construction tested in Experiment 1 were taken to indicate movement to an earlier point simply because a more direct means of expressing movement later, *postpone*, was not used (cf. Grice's [1989: 27] Maxim of Manner, "be perspicuous... avoid obscurity of expression"). A second possible factor in the prevalence of *Monday* responses is the demographic of our participant pool: all of the participants in Experiment 1 were university administrators. In previous work (Duffy and Feist 2014), we observed a similar preference for *Monday* responses in another population of university administrators. Hence, linguistic and lifestyle-based factors may have an additive effect on the temporal perspective adopted when a person resolves an ambiguous utterance. Of note, both these accounts of the high prevalence of *Monday* responses rely upon an interplay of multiple factors that together give rise to an interpretation, underscoring the finding from Experiment 1 that the individual lexical items in the question do not contribute independent bits of meaning that are added together to achieve a final interpretation.

We also note that, while we observed an effect of linguistically-encoded agency on the temporal perspective adopted, this effect was tied to the particular grammatical means of encoding agency. In addition to the personal pronoun, for which we observed an effect on the temporal perspective adopted, grammatical voice affords one means of communicating agency. Why then was there no effect of grammatical voice on the time perspective adopted? The answer lies in important differences between the two grammatical means of communicating agency. To wit, because constructions that do not conflict with one another may be combined within a single utterance (Goldberg 2003), there are active-voice expressions for both the Moving Ego perspective (e.g. *We're approaching Christmas*) and the Moving Time perspective (e.g. *Christmas is approaching* [*us*]), as well as passive-voice expressions for both the Moving Ego perspective (e.g. *Christmas is being approached by us*) and the Moving Time perspective (e.g. *We're being approached by Christmas*). Thus, the active voice, while an indication of agency, is no more associated with the Moving Ego perspective than the Moving Time perspective and, hence, may not tie into the comprehender's perceived level of agency.

In contrast, the Moving Ego and Moving Time perspectives differ in the assignment of the agent: in the Moving Ego metaphor, the ego (the active agent) moves forward through time towards the future, whereas in the Moving Time metaphor, time (the active agent) moves forward relative to the stationary ego (the passive patient). Thus, the Moving Ego metaphor is consistent with an

internal perspective on the event, in which the comprehender sees himself or herself as an active participant, while the Moving Time metaphor is consistent with an external perspective, in which the comprehender observes the movement of another. In line with this observation, in Experiment 2 we found that second person wording (e.g. *you have moved forward next Wednesday's meeting two days*) gave rise to the Moving Ego perspective, while third person wording (e.g. *she has moved forward next Wednesday's meeting two days*) gave rise to the Moving Time perspective, much as simulations have been found to be constructed from an internal perspective in response to a second person pronoun, but from an external perspective in response to a third person pronoun (Brunyé et al. 2009; Sato and Bergen 2013). Taken together, our results thus suggest that indications of agency that change the identity of the agent, but not the level of agency, are important to the adoption of a particular temporal perspective, thus refining our understanding of the implied agency associated with the Moving Ego and Moving Time metaphors.

Moreover, while this research has served to shed light on the roles of linguistic factors in the interpretation of temporal metaphors, it should be noted that the focus of our study has been restricted to a small subset of elements. Indeed, the ambiguous meeting probe is comprised of other lexical and grammatical elements, in addition to contextual and illocutionary factors, all of which may interact and contribute to the comprehender's interpretation. Our findings suggest that multiple linguistic elements combine to yield a contextualized interpretation (cf. Stefanowitsch and Gries 2003), adding to research on the relation between Construction Grammar and interactional approaches to language and communication, which stresses the importance of incorporating discourse and situational factors into grammatical description and representation (Fried and Östman 2005).

4 Conclusion

The frequency of use of metaphoric language to describe and refer to abstract concepts has generated a substantial amount of research, including much research centred around the psychological reality of the proposed connections between concrete source and abstract target domains. Particularly active has been research examining the connections between space and time, due in part to McGlone and Harding's (1998) ambiguous *Next Wednesday's meeting* probe, which has provided an ingenious means to delve into the temporal perspective adopted by participants during comprehension. In addition to providing evidence for the psychological reality of the Moving Ego and Moving Time metaphors (McGlone and Harding 1998), this research has uncovered evidence for ego-free temporal reference

strategies (Kranjec 2006; Kranjec and McDonough 2011; Núñez et al. 2006), and for the psychological reality of connections between the spatial and temporal domains which underlie the metaphors (Boroditsky 2000; Boroditsky and Ramscar 2002). However, little research has focused on the linguistic factors that influence the interpretation of a temporally ambiguous utterance like the *Next Wednesday's meeting* probe.

By examining a selection of linguistic factors that may motivate interpretation – and, hence, the ambiguity – of temporal statements like McGlone and Harding's *Next Wednesday's meeting* probe, our study aims to round out the picture of influences on metaphoric language interpretation. Our findings suggest that multiple aspects of the language of the question influence the temporal perspective adopted, with semantic content encoded in the combination of the lexical items and the construction rather than being subdivided and distributed amongst them. Taken together with prior findings, the results demonstrate that multiple sources of information interact in order to create meaning. Such interactions suggest that language interpretation may be accomplished via constraint-based processing (e.g. MacDonald and Seidenberg 2006; Trueswell and Tanenhaus 1994), which similarly posits that a myriad of information sources play an immediate role in the comprehension of words and sentences. To reiterate Farmer et al.:

> ...comprehenders use all salient and reliable sources of information, as soon as possible, to guide their interpretation of an incoming linguistic signal. Indeed, many factors...may influence how an incoming string of words is processed. (2012: 354)

In this regard, the processing of metaphorical expressions about time, and, in particular, the resolution of temporal ambiguity, is no exception.

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